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Memorandum

Subject: **ACTION:** Equivalent Level of Safety to 14 CFR Part 23,
§ 23.1143(g) and § 23.1147(b); Finding No.: ACE-00-09

Date: SEP 11 2000

From: Manager, Chicago Aircraft Certification Office, ACE-115C

Reply to Mike Downs
Attn. of: 847-294-7870

To: Manager, Small Airplane Directorate, ACE-100

This memorandum requests that your office review and provide concurrence with the proposed finding of Equivalent Level of Safety (ELOS) to the Engine and Mixture Controls requirements 14 CFR Part 23, § 23.1143(g) and § 23.1147(b).

Background:

The Cirrus SR-22 is a 3,400 pound single-engine, four-place, fixed-gear airplane powered by a 310 hp reciprocating engine. It has a conventional tractor configuration and utilizes composites for the structure. Some unique features of the SR-22 include sidestick controls and a ballistic recovery system. The SR-22 is a derivative of the currently certificated SR-20. The SR-20 met 14 CFR Part 23, § 23.1143(g) and § 23.1147(b) by placing a spring on the throttle which will bring the engine to full power in the case of a control disconnect. This is the only setting capable of continuing safe flight under all conditions. A landing is made by shutting off fuel to the engine once the aircraft is in a position to make a safe landing at an airport.

Applicable Regulations:

The applicable regulations are 14 CFR Part 23, § 23.1143(g) and § 23.1147(b), which state:

§ 23.1143(g): For reciprocating single-engine airplanes, each power or thrust control, must be designed so that if the control separates at the engine fuel metering device, the airplane is capable of continued safe flight and landing.

§ 23.1147(b): For reciprocating single-engine airplanes each manual engine mixture control must be designed so that if the control separates at the engine fuel metering device, the airplane is capable of continued safe flight and landing.

Applicants Position:

Cirrus proposes that by the use of positive retaining hardware, the possibility of control separation at the engine can be eliminated. This results in a configuration that is at least as safe as a design that has a possibility of a control disconnect and then uses another device to continue flight. This proposal is similar to the ELOS finding made on the Cessna 172R. It is believed that eliminating any chance of a disconnected control through positive retention hardware is safer than the possibility of an aircraft unexpectedly going to full power. This is particularly true on the ground in the proximity of personnel or obstructions.

Federal Aviation Administration (FAA) Position:

Literal compliance with these requirements would normally involve the addition of spring devices on the engine. The original intent of these regulations was to provide a means to continue safe flight and landing when a cable becomes disconnected. An ELOS finding related to the throttle and mixture controls was previously granted for Cessna models 172R and 182S. Cessna has proposed a similar design for the 206H with features which include a higher level of attachment reliability, establishment of mandatory inspection intervals, inspection procedures, and replacement criteria for the attachments.

Compensating Features:

The FAA finds that an ELOS will be provided to 14 CFR Part 23, § 23.1143(g) and § 23.1147(b) provided the following conditions are met:

1. An oversize AN970 washer holds the rod end captive even if wear causes the spherical bearing in the rod end to detach from the rod end body.
2. A castellated nut and cotter pin positively locks the entire hardware stack in place regardless of bolt rotation or fire.
3. An inspection step will be added to the maintenance manual to specifically check at required 100 hours and annual inspections for the security and condition of the throttle and mixture control cotter pin, castellated nut and oversize washer.

Recommendation:

We concur that the Cirrus SR22 proposed design of the engine and mixture controls attachments provide and ELOS to 14 CFR Part 23, § 23.1143(g) and § 23.1147(b).

Concurred by:

Boyd H. Little 8-18-00
Manager, Chicago Aircraft Certification Office, ACE-115C Date

Wm. K. Du 9800
Manager, Standards Office, ACE-110 Date

Michael Gallagher 9/10/00
Manager, Small Airplane Directorate Date
Aircraft Certification Service, ACE-100